Habib-Verse

Kaavish Report

by

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Dedication

We would like to dedicate this study to the students of Habib University. The mental health benefit of the student body has been the main source of encouragement throughout our project. May this project serve as a testament to the strength of community at Habib University.

Roles

Saad Abdul Hakim Qureshi - Game Designer, Game Mechanics Engineer, Networking Engineer

Muhammad Bilal - Level Designer

Alina Rashid - Level Designer

Muhammad Qasim Khan - Researcher

Acknowledgments

Our team would like to extend the first gratitude to our supervisor, Prof. Neelma Bhatti for her continuous guidance and support. Furthermore, we express our appreciation to all the beta testers whose feedback and enthusiasm fueled the refinement of HabibVerse. Your invaluable contributions have shaped this project into a meaningful endeavor for the entire Habib University community.

Screens

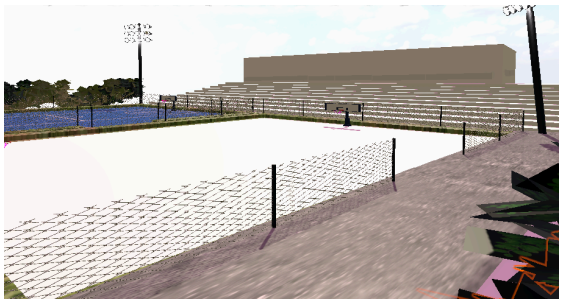


Fig 1.0 Courts (Page 24)

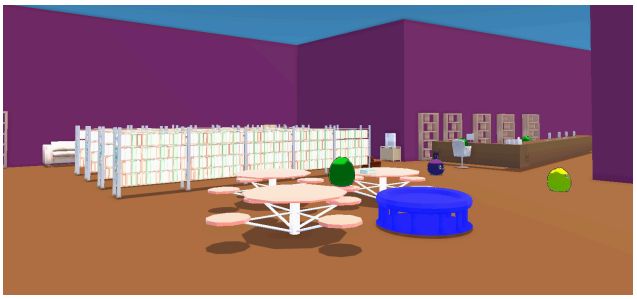


Fig 1.1 Library (Page 26)

Fig 1.2 Tariq Rafi (Page 25)

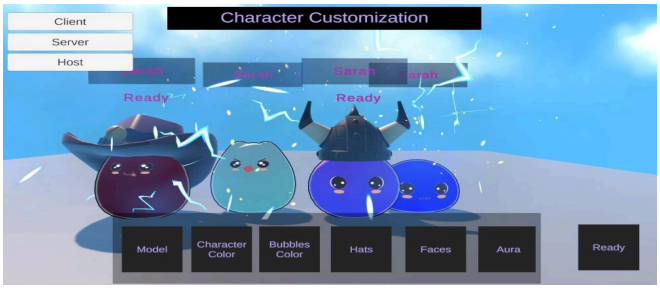


Fig 1.3 Character Customization (Page 19)

Abstract

University life presents a complex mix of challenges. Students grapple with social anxiety, academic pressures, and personal obligations, limiting opportunities for social connection. Newcomers, especially, face an unfamiliar environment, leading to isolation and potentially impacting mental health and overall university experience.

To address these concerns, we propose HabibVerse, a multiplayer platform built in Unity. Envisioned as more than a game, HabibVerse is a virtual replica of Habib University, capturing its unique character. The vibrant student community and dynamic campus life of HU provide the ideal template. We recreate the essence of HU digitally, with a touch of fun, offering an in-game treasure hunt for community building and a free-roam mode for casual interaction. This virtual escape from daily academic pressures maintains a sense of relatability to university life.

HabibVerse has significant potential to combat student isolation and enhance the Habib experience. University life extends beyond academics, encompassing everyday moments. From navigating campus to grabbing lunch, these experiences foster a sense of connection. While simulating the entire campus was beyond our scope, we successfully captured key landmarks to provide a familiar virtual environment.

Contents

1. Introduction

1.1 Problem Definition

Student isolation has slowly been becoming a pressing concern in Habib University with factors like limited communication, overwhelming exposure to university life, and packed schedules contributing to a sense of disconnect within the community. This isolation can impede academic performance and hinder the overall university experience, especially in the case of newly admitted students. Addressing this issue is paramount to ensuring students start their journey on the right track and thrive both academically and socially during their time at Habib.

To combat student isolation, our team has devised a multiplayer game known as Habib-Verse centered around a cartoonish rendition of Habib's campus. The approach of using gamification by means of in-game activities is appropriate because it makes the overall student experience not only relatable but enjoyable as well. The in-game treasure hunt activity in our game is catered for community building encouraging the players to not only interact and collaborate but also leverage and expand their knowledge of the campus. The free roaming mode in our game aims to allow players to further develop the relationships they make.

1.2 Scope and Deliverables

Since our main goal with this game is to eliminate social isolation and allow players to have fun, we envisioned the following crucial components to make it whole.

Free-roam Mode: The players by the form of their customizable in-game avatar characters can visit our virtual campus with whomever they want and where they want. The theme and size of our version of the campus is yet to be decided and we will conduct research based on the availability of assets and student feedback in the following weeks.

Treasure-Hunt Mode: This encourages communication and collaboration among players. The hunt will task players to look for items across campus hidden in popular locations or some new ones under a given time by searching for clues.

Slime Characters & Customization: Slimes have several characteristics that make them appealing to audiences. They are recognizable and cute, making them suitable as mascots for merchandise especially for adolescents. For games they offer fun traversal which makes them an appealing choice for traversing our campus as well as many customizations options. This is why we have created a character selection system where players can create slimes according to their own taste. Through this system players will be able to maintain their uniqueness but also find relatable elements in other players easily.

1.2.1 Deliverables

- 3D environment representing Habib University's campus.
- Multiplayer networking that connects multiple players inside this 3D environment.

- Character customization system allowing players to create unique slimes.
- Treasure Hunt catering collaboration, communication, and relaxation.
- Chat mechanism for players to communicate with each other.

1.2.2 Outcomes

- A virtual version of our campus environment accessible to the HU community on the go.
- Enhanced social connections and reduced feelings of isolation among students.
- A sense of escape from reality from daily academic struggles.

1.3 Research Questions

The impact of our game is measured based on the following four parameters:

Customizability (Uniqueness of Individual)	How do players perceive the character customization options? Does it contribute to feeling unique among others?
Relaxation (Danger to Academics)	For familiar players, did the game promote relaxation and a sense of campus life beyond academics?
Communication (Social Anxiety)	Did the treasure hunt help newcomers bond and connect with other players in the virtual environment?
Playability (Software Improvement)	How did players find the movement and interaction mechanics within the virtual campus? Did it affect their enjoyment?

Table 1.1 Research Questions

1.4 Feasibility

Our primary tool for creating this game was the Unity engine. Through the Universal Render Pipeline (URP), we were able to create animated maps representing famous campus spots. Through C# scripting we were able to program all our systems including character selection, lobbies, treasure hunt gameplay etc.

Here are some of the Unity packages, utilities, and other components we utilized to suit our needs:

Navmesh: This A* Path traversal library will assist in constructing intelligent Finite State Machine (FSM) agents, allowing us to create AI characters for our main menu screen.

Netcode: This high-level networking library was used for the creation of our lobby management system, character selection system and server client sessions for both our game modes.

Cine-machine: This built-in package takes charge of manipulating the main camera and enabled us to create a dynamic main menu screen..

Probuilder: This package allowed us to build our campus environment and make it scalable.

2. Literature Review

The literature review chapter aims to provide insights into the reasons behind student isolation and examine existing gamified implementations to inform the development of our strategy.

2.1 An Overview of Isolation in University Life

Loneliness, often perceived as social isolation, is a leading reason people seek counseling. According to a report in the US National Library of Medicine, there are two distinct types: emotional loneliness, resulting from a lack of close relationships, and social loneliness, caused by a deficient network of social connections.

Many studies on loneliness among university students have associated it with culture, gender, social media, mental distress, and academic performance. Their findings signify the importance of feelings of loneliness among adolescents and highlight the association between loneliness and transition-related changes during a significant period of their lives. Additionally, the study underscores the link between loneliness and mental health issues such as depression and anxiety, emphasizing the importance of implementing support networks, self-efficacy courses, and counseling services to address these challenges (Diehi, Jansen, Ishchanova, Koib 2018).

2.2 Academic, Social, and Psychological Causes and Effects

Before implementing any solutions, it is crucial to thoroughly understand the underlying causes contributing to student isolation. The phenomenon can manifest in different ways, affecting students' academic, social, and psychological well-being.

It is found that isolation, in particular, is apparent among students who lack proficiency and competency in their medium of instruction as they fail to understand their peers and tutors, causing a breakdown in their communication channels (Turula 2002). Furthermore, students from different cultures who just transitioned from high schools to universities, often voluntarily or involuntarily isolate themselves from their peers due to miscommunication and misunderstanding of a new culture due to the lack of time. Visiting students need to put in more effort in their academic lives due to language difficulties and the need to negotiate with a foreign culture, (Trice 2007). Poyrazli’s (2015) study revealed that international students experienced a certain degree of psychological problems ranging from lack of communication leading to depression and an increase in student attrition rate. A study conducted by Goncalves and Trunk (2014) found that such students who felt neglected often withdrew from their semesters.

A quantitative study conducted by Shing Yu Jolene Lim and Vighnarajah sheds light on the statistical significance of describing the severity of student isolation among tertiary students and also investigates the statistical impact of student isolation on students' university learning experiences. The research involved 581 students across various disciplines from UCSI University comprising 293 males and 288 females. A survey questionnaire was used as the form of data collection. The analysis demonstrated significant negative correlations between academic, social, and psychological isolation and university learning experiences, emphasizing the importance of addressing these factors to enhance students' educational outcomes and overall well-being (2018).

2.3 Gamified Solutions For Encouraging Social Connections

In recent years, the use of virtual experiences for interactive purposes has increased significantly. Many researchers believe that online gaming spaces can be socially accommodating environments for socially inhibited individuals and have the potential to be socially advantageous for shy individuals by allowing them to overcome their traditional social difficulties, and generate new friendships.

3D worlds can be defined as “Networked desktop virtual reality in which users move and interact in 3D space”. Within such environments, users are represented as avatars that allow users to convey their identity, presence, location, and activities while interacting with other users. In recent years, 3D virtual worlds have become increasingly popular. Such worlds have promising potential for supporting learning communities as a result of their capability to provide a social area of limitless possibilities. According to a study, virtual worlds offer an opportunity for people to interact in a way that conveys a sense of presence other mediums cannot offer. Communication possibilities can be either presented as limited choices of gestures or text-based chat tools (Kelton 2007).

Some examples of successful 3D virtual world applications include Second Life, a Metaverse involving a wide range of activities from virtual shopping and fashion to socializing and exploring. Another successful virtual world application is Minecraft, a sandbox game that allows players to create and explore their virtual worlds becoming a bigger virtual world in itself, with countless user-generated content and communities from across the world. A study conducted by Kowert, Domahidi and Quandt found that such worlds cause players to successfully expand the size of their social circles. To assess the success of these games a sample of 50,000 participants of console players of mixed genders from Germany aged 14 and older were asked about their gaming behaviours using telephone surveys. The results from the study indicated that emotionally sensitive users are using online gaming spaces differently from their counterparts, where a greater number of online friends never met transferred to offline environments (2014).

A study conducted by Fominykh, Prasolova-Førland, Morozov, Gerasimov focuses on virtual campuses as a framework for educational and social activities by introducing an innovative, educational collaborative virtual workshop at NTNU University. The study was modelled initially after Second Life, but found the platform to be hardware heavy and therefore used a systematic approach to design their virtual campus by using an empirical study to derive the requirements. Some of these were: users should be able to express their personalities through avatars, the system should provide learners with possibilities for social

networking, and the system should contain resources and tools to support a broad variety of activities both educational and social. Their platform's design consisted of an avatar customizer, a social arena containing possibilities for collaborative work, a blogosphere within the 3D world where individuals can be interconnected, and a map representing 2 major campuses of NTNU University with attention paid to both the interior and exterior. The architecture of the overall project used an advanced approach for designing complex interactions and gameplay behaviours (2008).

Another endeavor was undertaken at the University of Sydney to establish a virtual campus providing a comprehensive facility for Internet learning. The design of the virtual world was heavily influenced by the similarity between the physical world and the possibilities of leveraging this similarity in a virtual environment to increase student familiarity. The virtual campus is implemented as an object-oriented database using LambdaMOO accessed visually through dynamically created web pages. Its interface is based on a combination of icons and hyperlinks in a web window. Each room in the Virtual Campus contains a broad range of course materials and tools. Other features include information pages, a calendar, a bulletin board, and student tools. The use of an underlying object-oriented database for the implementation level has facilitated the incremental growth of the Virtual Campus. The consideration of the representation level and the conceptual metaphor of building design provides an intuitive environment that can expand to aspects of the physical campus not usually found in a virtual campus (Maher 1999).

A prototype of a blockchain-driven metaverse was developed at the Chinese University of Hong Kong, featuring a three-layer architecture comprising infrastructure, interaction, and ecosystem. Inspired by the 2018 film "Ready Player One," the project aimed to promote inclusivity by mitigating race, gender, and physical disability barriers, while also addressing the need for increased accessibility following the COVID-19 pandemic. Built on the Unity game engine, the metaverse incorporated a mixed environment where users' real-world actions mirrored their virtual interactions. The campus's 3D models were crafted using Blender, enabling players to explore the virtual campus in both first-person and third-person perspectives. Users were also encouraged to create and share customized content using the in-game tool builder. Through participation, residents could earn tokens for various activities such as shopping at the campus store, trading cards with peers, and participating in community voting. Furthermore, an AI-driven observation system monitored real-time operations and provided users with tailored event recommendations. To foster community engagement, the metaverse featured an online forum for discussions and collaboration (Fominykh, Prasolova-Forland, Morozov 2008).

As our project hinges on developing a space for students to familiarize themselves with the campus space and the student body, we decided to implement a treasure hunt game. Considering our goal is to reduce student isolation we opted for a treasure hunt style, multiplayer online game. Using such games to increase communication among students has proved beneficial, and allows them to strengthen their bonds with friends (Kargash, 2022). Using team formation and solving challenges together helped improve communication between students of different cultures and nationalities, and increased their knowledge of different cultures. A puzzle-style game was used to facilitate collaboration among the participants who were from Irish and Chinese universities. (Zhang, Goodman, & Gu, 2022). A similar study was conducted with around 181 university students divided into groups of 3-4, asked to solve a puzzle. The students reported an increase in their teamwork/team-based skills and an increased awareness of the importance of collaboration, effective communication, and accountability in a team (Cooney & Darcy, 2020). In one

such study, it was found that conversation dynamics had a huge impact on team performance in a game meant to locate a group of robots. When obstacles were present, the study found that the team acted much more as one unit compared to no obstacles present, where each team member worked in parallel (Simpson, et al., 2022).

As is necessary for every software, user feedback is essential to our game for improving the quality of play a user has and to enable the user to feel comfortable interacting in a similar physical environment. Conducting playtests is essential to identify different player styles and to identify what the user has learned from the game (Cooney & Darcy, 2020). In one such study, research was done on aspects of the game that increased the player's enjoyment/engagement in the game. The questionnaire handed to players at the end of the game asked them about the easiness of controls, if the interface was attractive, if they found the humor relatable, etc. The participants in the study were teenagers (aged 12-17) and older, which allows for greater validity on how to improve aspects of the game as about 70% of this demographic is involved in playing games. (Ferre, de Antonio, Imbert, & Medinilla, 2009). As such, we will be also building a questionnaire to collect user feedback to improve our game.

Author	Focus/Goal	Findings	Advantages	Disadvantages
Maher 1999	Virtual Campus For Internet Learning.	Replicated the entire campus environment through web pages linking campus spaces containing books and other resources.	Was ahead of its time and was successful in making the students familiar with the campus environment.	Didn't encourage communication in the student body and focused more on academics.
Fominykh, Prasolova-Forland, Morozov 2008	Virtual Campus as a Framework for Educational and Social Activities.	Had a well-designed implementation for a possible metaverse that involved many elements such as avatar customization, social arenas, and collaborative work.	The project took into account existing implementations and accounted for their shortcomings before conducting an empirical study to design its implementation to ensure optimization and playability.	Did not go into detail about possible privacy and security concerns on the user's side for a project of this scale. Moreover, the project was still in its initial phase when the report was published indicating it was not sustainable. Lastly, the project was more focused around academic activities rather than fun activities.
Duan, Li, Wu, Lin, Fan. Cai 2021	Campus Metaverse for Social Good.	Created a virtual 3D campus environment in Unity that contained activities encouraging player collaboration and campus exploration.	Involved a complex three-level infrastructure including a variety of elements such as inclusivity, real-world integration, creativity, and a balanced ecosystem.	Considering the scale of the project it did not provide valuable information on encouraging player characters to be unique as well as monetizing activities.
Braud, Fernandez, Hui 2022	Scaling-up AR: University Campus as a Physical-Digital Metaverse	Studies the feasibility of a large scale and persistent AR experience shared among university students.	Defines an integrated framework to enable an AR campus metaverse involving multiple global metaverse campuses connected. Furthermore, it goes into details of how distinctive indoor and outdoor environments can be created through modern GPS scanning techniques.	Does not go into details of how these campus environments can be designed to encourage player interactions.
Herrara 2023	Metaverse in a virtual education context.	Explores the characteristics and influence of 3D tools in the teaching process.	Highlights the potential of using a 3D virtual world in education where avatars can be connected in real-time and how it can be leveraged for training students in complex tasks in real-time which would be expensive in practical life. This signifies the importance of a virtual metaverse having limitless possibilities for player engagement.	Is more philosophical than practical and does not have a proper design to carry out its goal.
Rema 2023	Virtual Reality and the Future of Social Interaction.	Investigates the impact of virtual reality to revolutionize social interactions.	Elaborate on the limitless possibilities of virtual environments that simulate real-world experiences such as granting individuals with disabilities access to social experiences and how customization can help shape user experiences. Additionally, unlike other papers, this review discusses the challenges of ensuring safety and ethical use in a virtual environment.	Virtual reality although on the rise is not feasible for most students due to the high cost of acquiring a VR headset.

Table 2.1 Literature Review

3. Software Requirements Specification (SRS)

This Software Requirements Specification (SRS) chapter outlines the requirements for our game.

3.1 Project Deliverables

Following are our deliverables:

Player Controller and Mechanics
Free-Roaming Campus Environment
Treasure Hunt Mode
Multiplayer Networking System

3.2 Functional Requirements

3.2.1 User Interface & Lobby System

Dashboard/Lobby System:
This will be the entry point for our game, which will allow players to sign up, sign in, join and create lobbies, and choose between the free-roam mode and minigame mode. Some features of the overall dashboard system are:

- Menu music is playing in the background.
- The camera is hovering over our campus environment.

Following are the main screens of our dashboard.

Title Screen:

After successful authentication players will be redirected to this main dashboard screen where players can either view information and rules about the game or join and create lobbies.

Frontend:

- Players can click on the name button to change their name.
- The game logo will be shown.
- Upon clicking the logo players will be shown the lobby screen.

View Lobbies Screen:
This screen will show all public lobbies inside a table that will contain the following information:
Frontend:

- Show number of players.
- Show lobby name.
- Show game mode.

Players can join a lobby using the join button which will redirect to the lobby screen.

Create Lobby Popup:
This is a popup that will allow players to create a lobby with a maximum of 10 players.
Frontend:

- Change lobby name.
- Change Mode to Free roam or Mini-game.
- Lobbies are public by default, and can be changed to private.
- Create button will take to the lobby screen as host.

Global System/Interface:
Below are the screens and popups that are same for both our game modes once a game has started:

Lobby Chat Popup:
This popup will not only be shown in our lobby but also in the game.
Frontend:

- Contains a text field and send button for sending messages.
- Has a feed container for receiving messages from other players.

Backend:

- Messages are received by all players in the session.

Pause Screen:
This screen will be accessed in-game by players.

- The Quit button will allow players to leave the game and redirect to the dashboard.
- A table will show the current players in the game for the free roam mode and, depending on the minigame's design, will show the players in the team.

Loading Screen:
This screen will show a loading loop for the following transitions:

- Starting a game.
- Joining a game.
- Leaving a game.

3.2.2 Player Mechanics & Character Customizer

Player Controller
Players will be able to navigate the campus environment by bouncing their slimes around, utilizing a trampoline jump system to reach lofty heights and a rolling down slide mechanic to descend to lower levels.. Additionally, a boomerang aiming system will allow players to hurl boomerangs at each other, with a limited inventory capacity requiring periodic refills. This combination of mechanics offers a

diverse and engaging experience for players as they explore the campus and interact with one another.

Character Customizer
This system provides extensive customization options for players to personalize their slimes. They can choose to alter the slime model, adjust both the model and its color, customize movement particles and their color, and even add various props like hats and glasses.

3.3 Non-Functional Requirements

Scalability/Seamless Networking: Users do not have to worry about network infrastructure and easily connect with their friends through our interface. The game can handle up to 6 players per session.

Error Handling: The system provides meaningful error messages to users, such as network disconnection popups.

Rendering-Performance: Rendering objects are optimized to be playable on modern hardware without dedicated GPUs.

Privacy: Networking player's data should be secured in servers made by other players.

3.4 System Diagram and Description

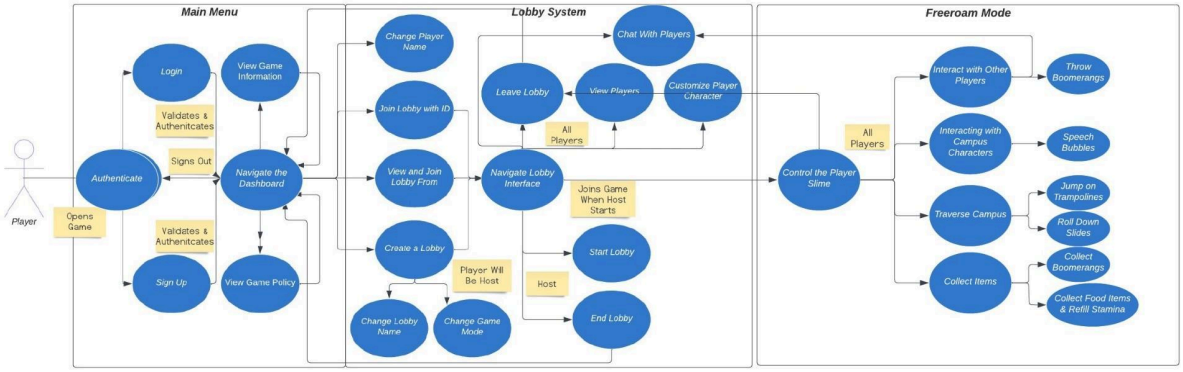


Figure 3.1 User Diagram

Once users are passed our logo screen, they can create a lobby as a host or join lobbies created by other players. After a lobby has started users can customize their slimes until all players are ready. After joining the accessible roam mode, users can control their slimes and either traverse the campus with their friends or people they meet in lobbies, interact with campus characters, or collect items such as boomerangs or food. If users are in the treasure hunt mode, the game automatically starts the treasure trail.

4. Software Design Specification (SDS)

This chapter provides important artifacts related to the design of Habib Verse. Since this project is being developed using Unity, much of the game design revolves around leveraging its programming infrastructure, SDKs and APIs.

4.1 Game Setting and Core Mechanics

This game is primarily being developed for the purpose of encouraging communication and collaboration between students, the perfect setting for our game is the Habib University campus divided into separate locations. Each campus location is being designed in a way that encourages players to either free roam together or participate in a treasure hunt with customizable slime characters.

If they choose to perform the latter below is our core game loop. When entering the map, players will receive a task in the form of a hint. This hint will indicate a location on a map that holds another hint or the treasure itself. Players will then have to collaborate to find the glowing treasure on the map under a specified time else they lose and the trail will disappear. Each treasure will contain information on campus life which students often do not know. Players will be able to communicate their knowledge through the chat interface.

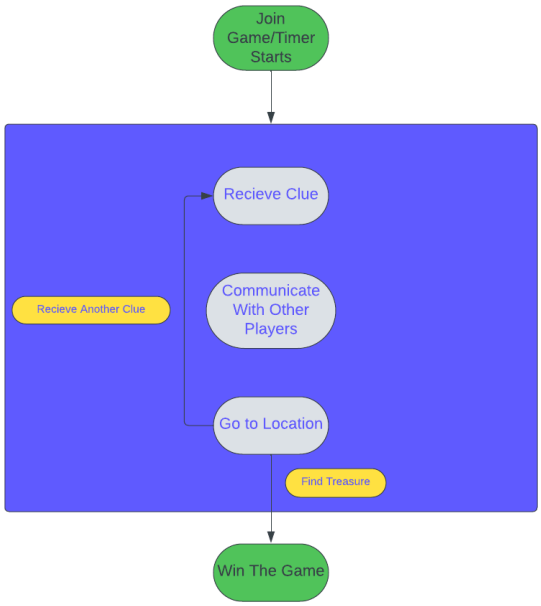


Figure 4.1 Treasure Hunt Loop

If players just want to free-roam the campus, they have the option of joining a map with the players they meet. They can collect and throw boomerangs at each other, absorb items such as food for sprinting stamina, roll down slides, jump on trampolines, or find hidden items that can significantly increase their slime's size.

4.2 Lobby And Customization System Design

This section summarizes the design of our lobby and customization system. A lobby can be started by a host, who will decide the game mode and map location. The lobby created can be joined by anyone. For the demos, each lobby can contain up to 6 players.

Figure 4.2 Lobby Screen

Once the lobby has enough players the host can start the game which will redirect all players to the character customization scene where players are able to freely modify their own slime characters. Based on current feedback from the Habib community conducted through a Google forms survey the modifications we are adding are changing hats, auras, expressions, and models. The expressions feature allows students to express their own feelings. Through hats and model choices students can express their stylistic preferences and can find relatable elements in other players easily. Once all players are ready or the customization time expires, players are redirected to the environment based on the map selected and the respective game mode begins.

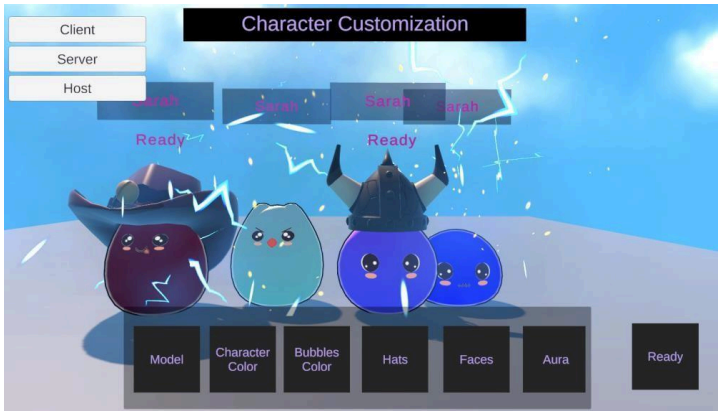


Figure 4.3 Character Customization Screen

While customizing their characters or in a game mode players can use the following chat interface to communicate their thoughts. The chatting interface uses a profanity filter in order to prevent inappropriate language from being displayed. If a player attempts to use a prohibited word, it will be replaced with asterisks (*) or another suitable placeholder. This filter helps maintain a respectful and enjoyable gaming environment for all players.

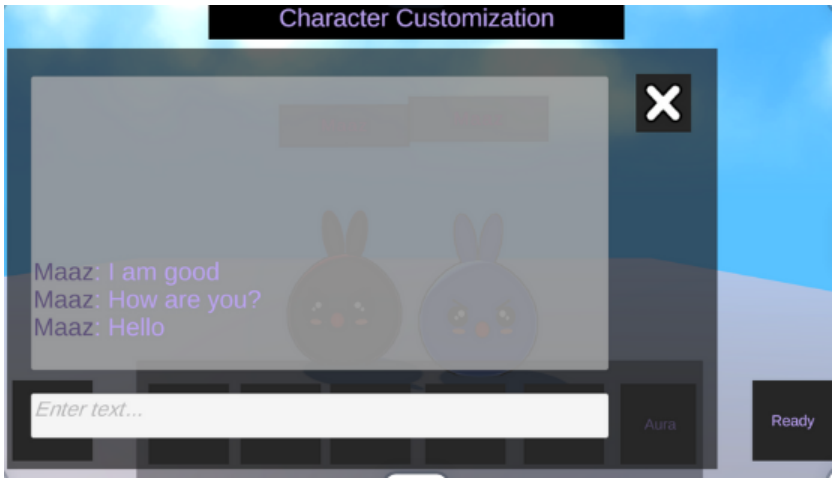


Figure 4.4 Chat Popup Screen

4.2.1 Slime Character Survey

The second part of the experiment process was selecting a genre for our game characters. We decided to go with Slimes as they have several characteristics that make them appealing to audiences. They are recognizable and cute, making them suitable as mascots for merchandise especially for adolescents. For games they offer fun traversal options which makes them an appealing choice for traversing our campus. Just imagine navigating a cartoonish version of our campus, encountering AI characters having their own slimes representing famous campus personalities ,all while embodying your own distinct slime character. By infusing the simplistic creativity customization of Among Us into our game, we aim to create an experience that resonates with you.Slimes have been a part of pop culture for awhile now especially in gaming appearing in franchises like Pokemon, Dragon Quest, and even Elden Ring and have recently gained even more popularity in anime and manga, particularly after the success of the series "That Time I Got Reincarnated as a Slime." This anime, which began airing in October 2018, features a protagonist named Satoru Mikami who is reincarnated as a slime in a fantasy world filled with magic and monsters. The show's unique twist on the isekai genre, combined with its high production value and engaging worldbuilding, contributed to its popularity. The success of "That Time I Got Reincarnated as a Slime" sparked a trend, leading to the creation of more slime-centric anime and manga.

A Google form titled “Habib Verse - Slime Character Mechanics and Customization Feedback” aimed to gather insights into students' preferences for the customizing these slime characters. The customization options and gameplay mechanics mentioned in Chapter 4 section 1 were also kept in the survey so we could get feedback on them.

4.2.2 Survey Questions

In order to assess if students were familiar with slimes we asked the following questions:

Are you familiar with Slime characters?

In order to assess which customization options students preferred we asked the following questions:

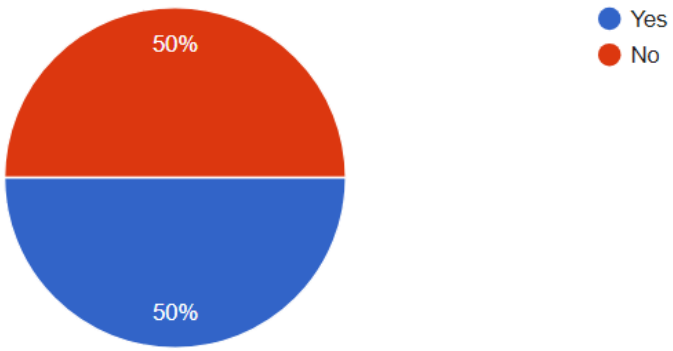
Which customization options would you prefer?
For hats, we aim to bring relatability in our game. One student suggested a graduation hat. What others hats do you have in mind?

In order to assess which mechanics students preferred we asked the following questions:

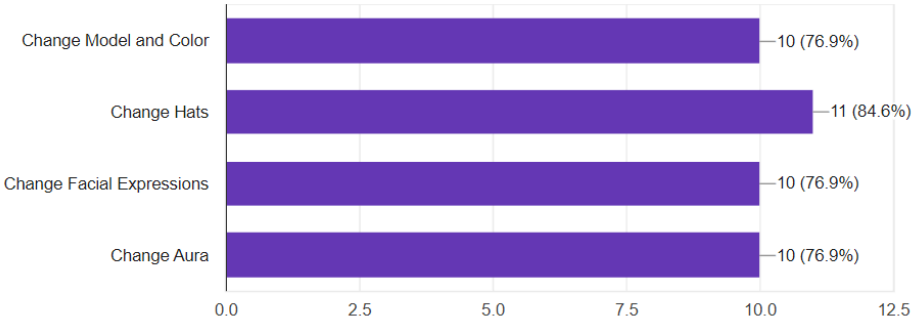
Here are some mechanics we are aiming to develop for these slimes based on their characteristics. Which of them would you prefer?
What other mechanics do you have in mind that would make these slimes fun?

4.2.3 Survey Results

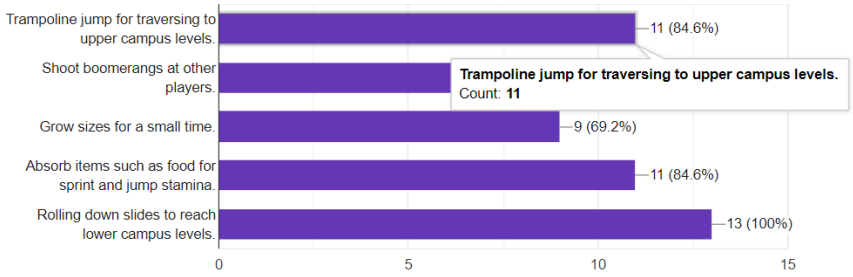
We received a total of 14 responses. When asked about students' familiarity with Slime characters, 50% of them were aware. We decided to proceed with it in order to keep an explorative nature in our game. Furthermore, students preferred the character customization options changing model, and color, changing hats, changing facial expressions, and changing aura. Other options included slime size which we decided to keep as a collectible in our free roaming mode and more dressing features which we will be adding as the game develops further. Hats preferred by students included Bandana, Crown, Viking. We decided to add these hats as we find their models online. Students also preferred the gameplay mechanics we chose for the slimes and mentioned others such as speed dash and liquid traversal. We decided to add the former as a sprinting mechanism.



Pie Chart 5.5 Students familiarity with Slimes



Histogram 5.5 Students Reactions To Customization Options



Histogram 5.6 Students Reactions To Slime Gameplay Mechanics

4.3 Game Maps

4.3.1 Purpose and Conceptual Design

During the planning phase of our project, we aimed to create a virtual representation of significant locations within Habib University to achieve two main objectives: to familiarize users with the campus and to facilitate interaction among peers. Tariq Rafi Lecture Hall, being the largest classroom on campus, was chosen as our first location for its prominence and capacity to host a large number of students simultaneously, making it an ideal setting for our game's objectives. The second critical location was the university library, encompassing both the Info Commons on the ground floor and the study zones on the first floor. Recognizing its status as a central hub for collaboration and quiet study, the library's inclusion was pivotal. Our third location, the Tapal Cafeteria, and the combined areas of the Garden and Courts, were selected for their social significance, offering spaces for relaxation, socialization, and physical activities. These choices were underpinned by the goal of providing a comprehensive virtual experience of the university's most vibrant hotspots.

Initially our vision was to meticulously virtually recreate. Habib University's most iconic locations, transforming them into interactive stages within the game. This concept was derived from the desire to mitigate student isolation by recreating spaces where students traditionally socialize, collaborate, and

learn. Leveraging Habib University's vibrant student life and architectural distinctiveness, we aimed to develop a virtual campus that resonates with the ethos of the real world setting while introducing an imaginative twist that enhances player engagement. The choice of including treasure hunts and interactive elements, such as slides and boomerangs, was strategic, designed to encourage exploration and interaction within these virtual spaces, fostering a sense of community among players.

4.3.2 Research , Reference and Adaptation

Our methodical approach began with a survey to understand student preferences, which was complemented by consultations with Habib University's senior civil engineers for architectural accuracy. Utilizing the university's virtual maps as a reference and conducting multiple site visits, we aimed to capture the essence of the campus.

Each selected location was carefully adapted to support our game's mechanics. The Tariq Rafi Lecture Hall, with its spacious layout, was designed for multiplayer interactions and events, encouraging collaborative learning and socialization. The library, representing academic and social convergence, was segmented into zones like the Info Commons and quiet study areas, each offering unique challenges and interactions, from collaborative puzzles to quiet, introspective quests. The Tapal Cafeteria and the Garden Area were transformed into vibrant social hubs, mirroring the university's lively atmosphere. The sports courts were reimagined as arenas for competitive mini-games, promoting teamwork.

4.3.3 Key Locations and Interactivity

The game features detailed recreations of iconic university spots, each chosen for its significance in student life and its potential for fostering virtual community engagement. These locations were not only visually replicated but also functionally designed to support specific game mechanics, such as treasure hunts and interactive puzzles, enhancing the gameplay experience.

A significant feature of our game is the live chat functionality, enabling real time communication among players. This interactive component is crucial for fostering a sense of community and collaboration within the virtual campus environment. This feature is complemented by treasure hunt creating a dynamic and engaging virtual environment

4.3.4 Software and Tools

Unity's ProBuilder and the Unity Store were instrumental in constructing the game's maps and importing necessary assets. The use of colliders and custom scripts enabled us to create interactive elements that are integral to the gameplay, such as hidden treasures and obstacles. The game's networking was built using Unity's Netcode for GameObjects, allowing for seamless multiplayer experiences across the virtual campus.

Figure 4.5 Garden Area

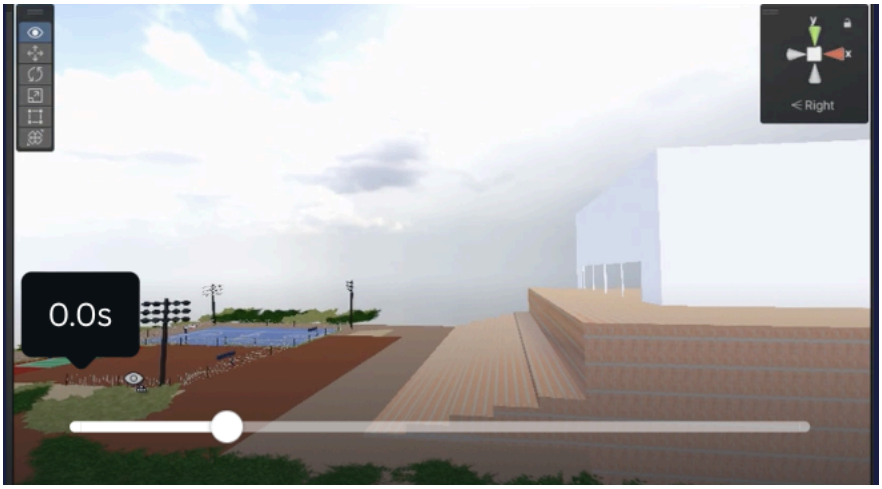


Figure 4.6 Courts area

Figure 4.7 Tapal Cafeteria

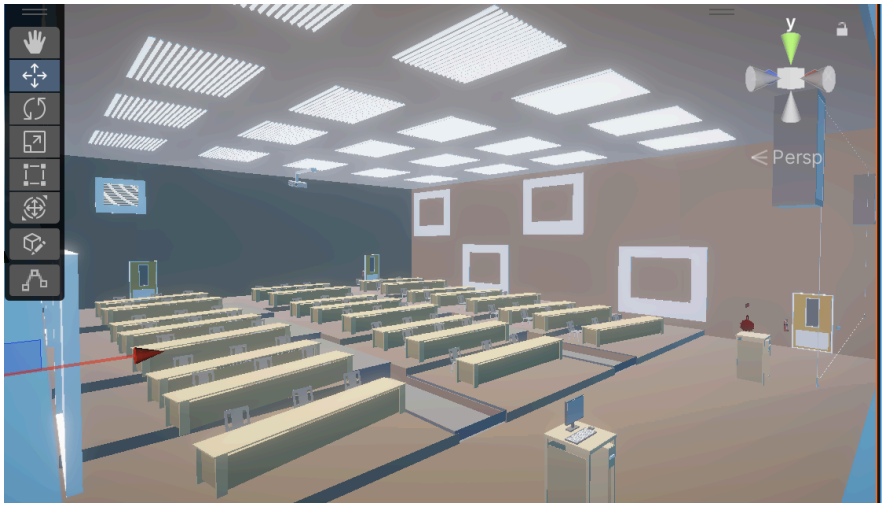


Figure 4.8 Tariq Rafi Classroom

Figure 4.9 InfoCommons(Library)

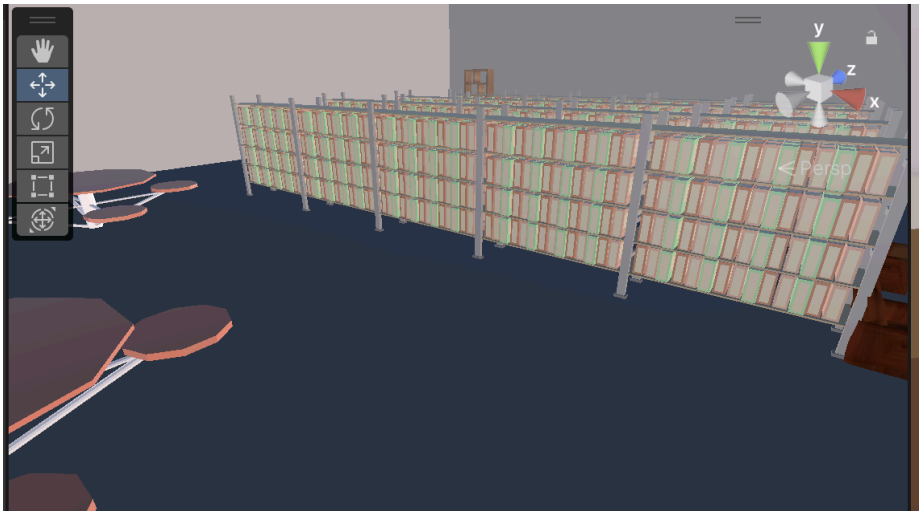


Figure 4.10 1st Floor Library

4.4 Game Architecture

This section presents the game architecture by giving a brief description of some of the classes in our game which is being made on Unity along with a UML diagram.

We will be leveraging Unity's networking client-server infrastructure known as Netcode. Many of the classes involved are children of **NetworkBehaviour** to ensure synchronization of states across all clients from the server's end instead of just locally on the player's end. Other classes are children of MonoBehavior, a class that allows game logic to be performed every frame locally. This combination of

classes will allow code to be executed either locally on one client's end or synchronously across all clients.

Based on this networking requirement we have following the following classes to execute our game logic:

NetworkManager: This class, in general, is commonly used in Unity's **Netcode** networking architecture to manage network connections between clients, spawn their players when server is started, spawn network objects for all clients and handle various network-related events. It often serves as a central hub for managing the overall networking state of a Unity application such as changing the current scene when host starts the game or when all characters are done with their customizations.

LobbyManager: The class is a central component responsible for managing player interactions within the game's lobbies before a game session starts. It utilizes the **Unity Services Lobby and Relay SDK**, and oversees the creation, joining, and management of lobbies, incorporating features such as lobby customization, player authentication, and game options. The class handles lobby-related events like joining, leaving, or starting a game and making sure all players have the same network manager session.

Habib-VerseMultiplayer: This class is a child of Network Behaviour and takes charge of overseeing all connected players once the game is underway, ensuring a smooth exit for players without disrupting the session. Its primary role involves storing and updating player information in a network list, encompassing details like player names, per=session client ID, and customization data. Upon a player's entry into the game, an instance of this class is generated, and it gracefully handles the recreation process when a player returns to the dashboard.

UIManager: This class is designed to develop the frontend with all screens within our game, including authentication, lobby lists, and paus. Its core responsibility lies in managing the functionality and connectivity of these screens by operating with other essential classes like **LobbyManager**, **Habib-VerseMultiplayer**, and **LocalPlayerGameManager**, either by recording their events or calling their functionality based on player input.

Freeroam/MiniGameManager: This class, derived from Network Behaviour, is responsible for manual spawning of player characters after all players have joined the game session. For the freeroam mode it is responsible for spawning and despawning items like boomerangs, food and size boosters after they have been collected. For the treasure hunt mode this class will be responsible for hiding the treasure at a location with a hint and maintaining synchronized timer. When the time experies or the treasure has been collected it assigns the necessary rewards and returns the players to the lobby.

LocalGameManager: This class is responsible for maintaining the player's local game state by invoking events for player being paused and player having left the game.

PlayerController: This class, derived from **NetworkBehaviour**, is a client-authoritative entity, performing computations by means of a finite state machine to be executed on the player's local end. Its pivotal role is capturing user input, implementing player mechanics such as stamina, and shooting, and performing player movement. By collaborating with key player components such as the rigid body, character controller, and mesh collider, it forms an integral part of crafting the player.

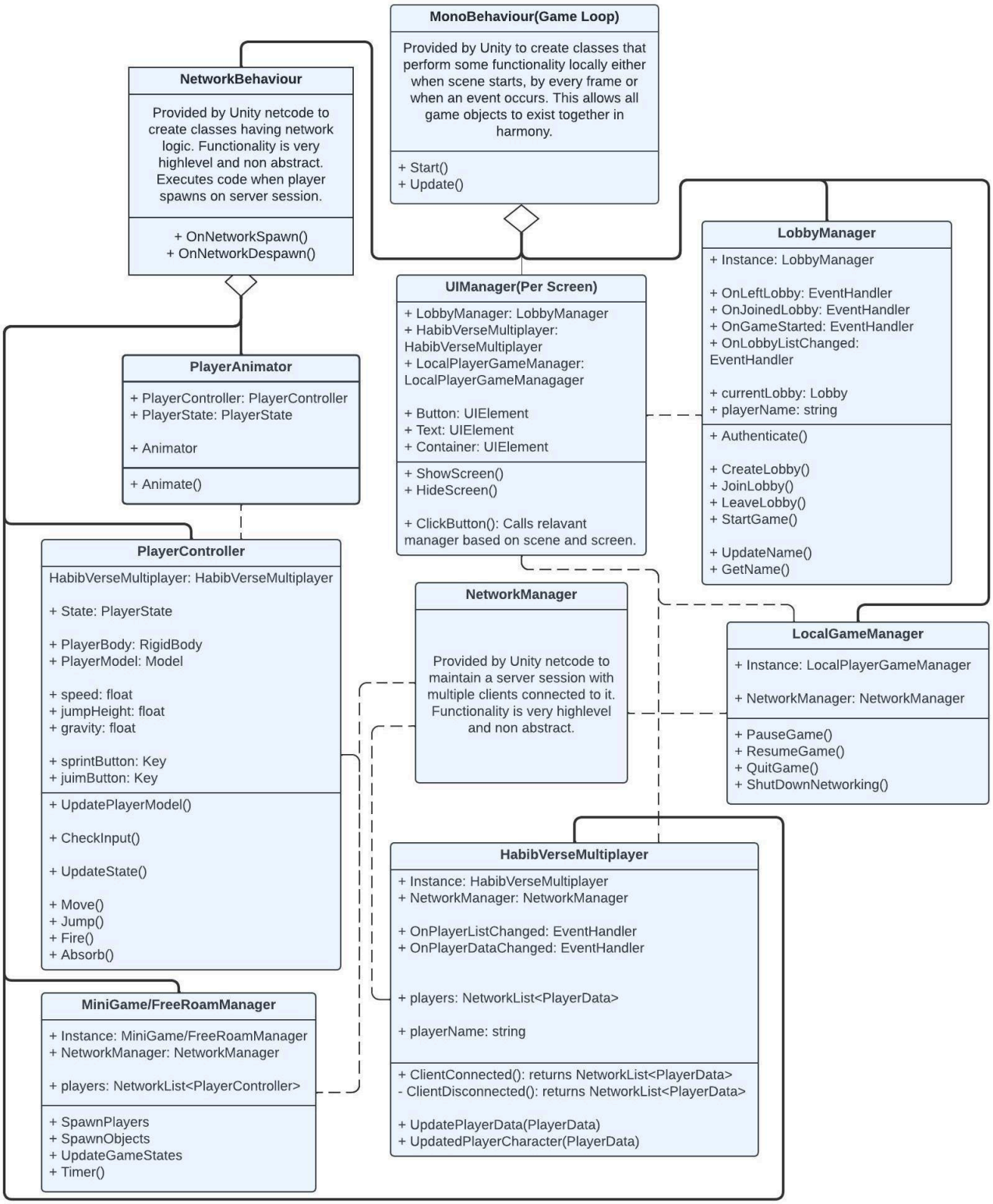


Figure 4.11 UML Diagram

5. Results and Experiments

The results and experiments chapter of our report aims to validate our game and test our outcomes.

5.1 Isolation in Habib University

The first and most important part of the experiments process was proving the novelty of our project. We released a google survey in order to analyze to what extent student isolation has become a problem in the context of Habib University.

A Google form titled “Enhancing Society FYP Initiative” aimed to gather insights into how students spend their free time, their preferred leisure activities, and if they’ve ever experienced moments of isolation during their time on campus in order to guide the development process.

5.1.1 Survey Questions

The questions are aligned with the four parameters listed as evaluation criteria in section 1.3 Research Questions. These parameters were introduced in the research as a means to evaluate the impact of the game.

Communication (Social Anxiety)
In order to assess when and why students start feeling isolation we asked the following questions:

In which academic year are you in right now?
Have you ever felt a sense of isolation during your time at Habib?
What are the reasons for this if you do?
On a scale of 1-5 how comfortable are you talking to new students you meet?

Relaxation (Danger to Academics)
In order to assess how students spend their free time we asked the following questions:

How many free hours from classes do you get per day?
How do you spend these free hours?
What sort of fun activities do you do most when you get a break from studies?
What’s your way of relaxing?

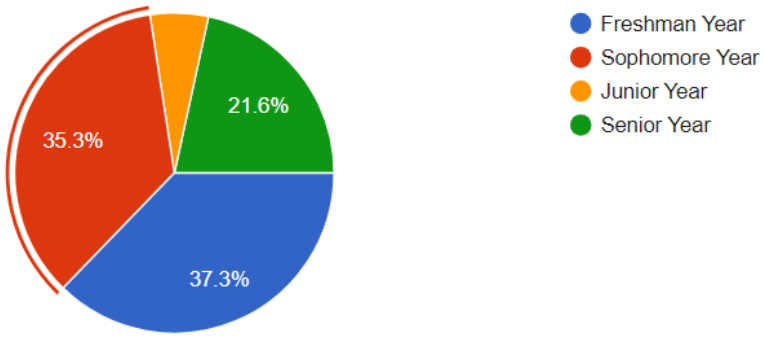
Playability (Software Improvement)
In order to assess how our game should be designed we asked the following questions:

Would you be interested in participating in a multiplayer game catered for Habib students designed to combat this isolation and encourage social interaction?
If yes then what genre would you want your virtual character to be from?

What sort of mechanics would you want your character to have such as a bunny hopping ability?
Would you rather see a virtual cartoonish version of our campus or would you rather see a new environment?
If you want a cartoonish version of campus what elements would you want to change?
If you want a cartoonish version of campus what elements would you want to remain the same?
What element of a game of this sort would excite you?

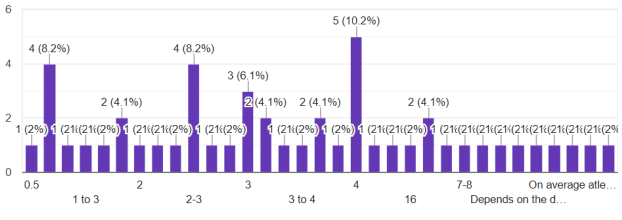
5.1.2 Survey Results

Total responses for the survey were 51 which were almost equally divided among Freshmans, Sophomores and Seniors since Juniors were the least responses.

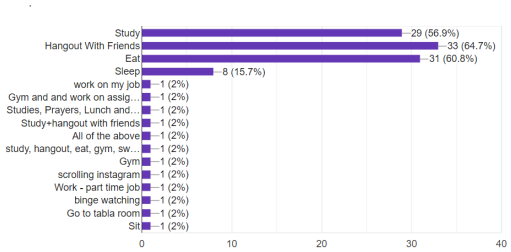


Pie Chart 5.1 Responses Year

Students were free between 1-6 hours during their daily classes with 1 being the most common response. Majority of the students spend these hours hanging out with friends, studying, eating or sleeping. Other activities involved exercising, working, and praying.



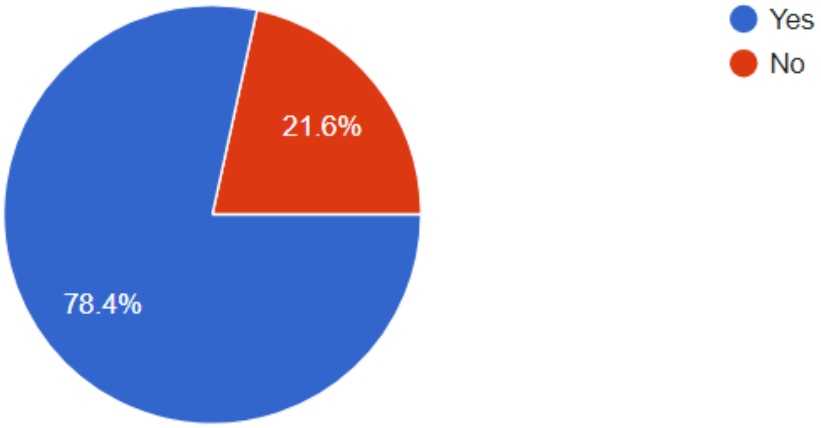
Histogram 5.1 Hours Free



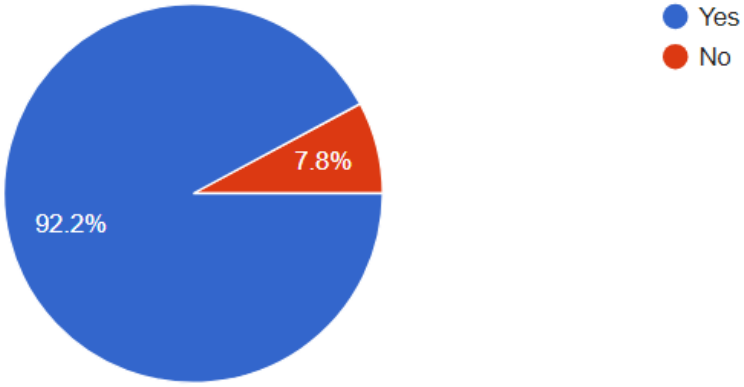
Histogram 5.2 Free Time Activities

Perhaps the most important question from our survey was asking students if they felt a sense of isolation during their time at Habib. 40 out 51 students responded yes. When asked the reasons, responses included

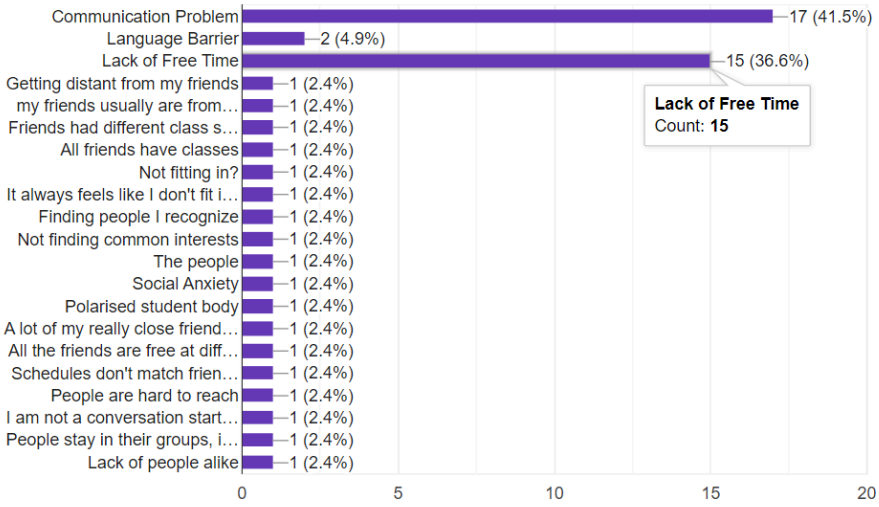
lack of free time, communication problems, schedule mismatch with friends, relatability issues, social anxiety etc.



Pie Chart 5.2 Students in Isolation

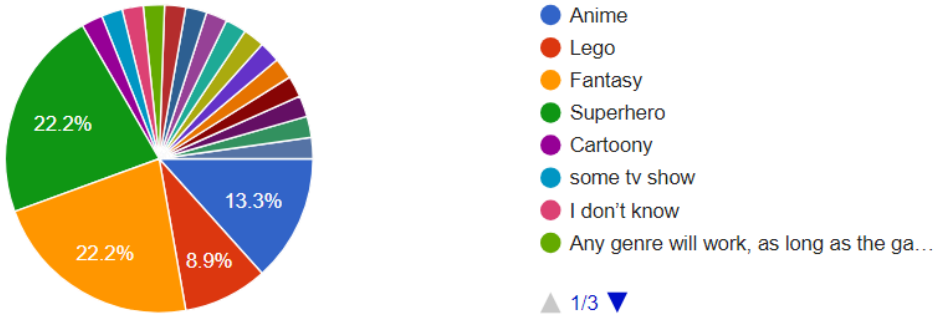


Pie Chart 5.3 Student Interest in Habib-Verse

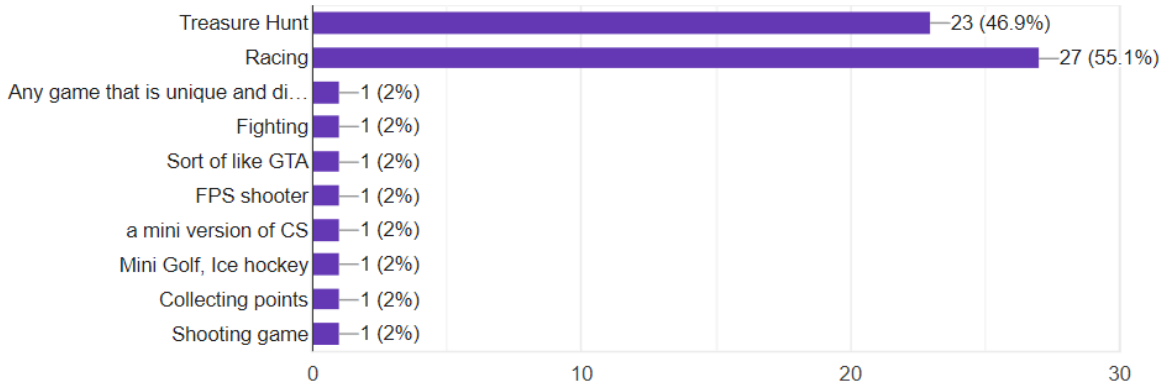


Histogram 5.3 Reasons for Isolation

Based on the feedback received it was evident that isolation is a problem in Habib University and is being facilitated by factors most importantly lack of free time and fun activities to help students bond. When it came to our strategy itself over 45 students were interested in participating in it. After analyzing the responses from the surveys we felt confident in Habib-Verse as a platform for students to bond as it can easily be accessed by students on the go and facilitates them with fun activities.



Pie Chart 5.4 Character Genres Preferred by Students



Histogram 5.4 In Game Activities Preferred by Students

When it comes to the design choices students prefer many genres for their in game character such as lego, anime, superhero etc. Students also suggested a variety of mechanics for their characters such as sprinting, flying, and super powers indicating prior experience with games further encouraging our solution. Students also preferred treasure hunting and racing as the in-game activities but we felt more confident with treasure hunting due to its collaborative nature and had to limit our scope to it.

5.2 Playtest Demo

5.2.1 Playtest Purpose

Playtesting is a crucial step in game development, allowing us to identify and address issues before the final release. For our game, we conducted a playtest with a randomized group of university students from different backgrounds , schools (DSSE and AHSS) and academic years.

Our playtest aimed to comprehensively evaluate the user experience of Habib Verse, a game designed to help new university students adjust to campus life and connect with peers and to address student isolation at Habib University. We focused on the following key areas:

1. Character Customization and Identity: We explored how character customization options impact players' perception of uniqueness and self-expression within the game. This feedback helps determine if the current slime customization mechanics effectively contribute to a sense of individuality and connection among players.

2. Social Interaction and Relaxation: A core function of Habib Verse is fostering social interaction and relaxation amidst academic pressures. The playtest evaluated if players find the gameplay environment conducive to relaxation and familiarity with the virtual campus, even beyond academic buildings. We were interested in how interaction mechanics, like the treasure hunt, facilitate bonding and communication, especially for players who might experience social anxiety.

3. Playability and Engagement: The playtest assessed the core mechanics of movement and interaction within the virtual campus environment. Feedback on these aspects helps us identify areas for improvement and ensure the overall gameplay is enjoyable and engaging for users.

By delving into these areas, we aimed to gather valuable insights to refine Habib Verse and ensure it functions effectively as a tool to combat social isolation and enhance the overall university experience for Habib students.

5.2.2 Results and Research Questions

We conducted two separate playtests. The first playtest focused on the free-roam environment, allowing us to assess aspects like character customization and overall playability within the virtual campus. The second playtest centered on the treasure hunt mode, specifically evaluating its effectiveness in fostering social interaction and communication.

5.2.3 Play Test Questionnaire

Character Customization: We explored the importance of character customization to players, their satisfaction with the available options (hats, colors, expressions), and the impact of customization on enjoyment, self-expression, and overall gameplay experience.

How important is character customization to you in a game?
How satisfied are you with the variety of hats/colors/expressions available for your slime?
Did you enjoy customizing your slime character with hats/color/expression?
Did the hats/color/expression add to your enjoyment of the game? How?
Did the customization for your slime allow you to create a slime character that felt unique to you? Did it help you to express yourself? (Yes/No/Why or why not?)

Gameplay Mechanics: Questions focused on player enjoyment and ease of use regarding the boomerang and trampoline features.

How much did you enjoy using the boomerang and trampoline during the game? (Why or not? How did these features add to your gameplay experience?)
Did the boomerang and trampoline controls feel responsive and easy to use?
If not, how could the controls be improved?

Social Interaction: We assessed player comfort level with interacting in the virtual university setting and their ability to understand text chat communication.

How comfortable did you feel interacting with other players in the virtual university setting?
Did you find it easy to understand the communication style (text chat) of other players?

Relaxation and Exploration: Questions gauged how players perceived the game's pace (relaxing vs. fast-paced) and its effectiveness in helping them unwind.

Would you describe Habib Verse as a relaxing or fast-paced game?
How well do you think Habib Verse helps you unwind and relax after dealing with university academic pressures?

Social Engagement: We inquired about memorable moments of social interaction between players.
Did you have any fun or memorable moments interacting with other players during the game? (If yes, please describe one such moment.)

Campus Familiarization: Questions explored the potential of Habib Verse as a tool for new students to learn the campus layout.

Do you think Habib Verse could be a helpful tool for new students (freshmen) to familiarize themselves with the university campus layout? (Why or not? How could it be improved for this purpose?)

Community Building: We assessed the sense of community players felt during gameplay, considering diverse backgrounds and academic years.

During gameplay, did you feel a sense of community with the other players, even though they might have different backgrounds or academic years? (Why or not? What aspects of the game contributed to this feeling (or lack thereof)?)

Navigation: Questions focused on the ease of navigating the virtual university map and the intuitiveness of the lobby layout.

How easy was it to navigate around the virtual university map?
Did the layout of the lobby feel intuitive and easy to understand? (If no, what aspects of the layout were confusing?)

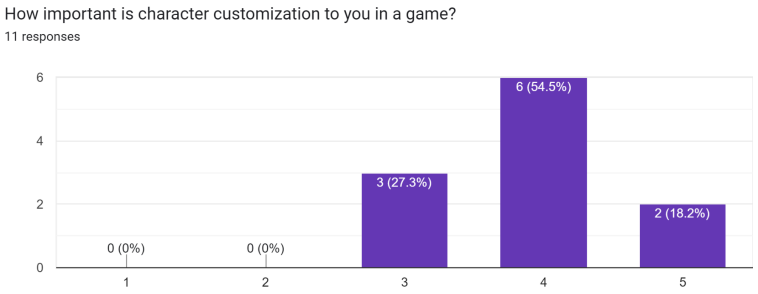
Treasure Hunt: We evaluated the frequency of collaboration needed during the treasure hunt and the overall impact of social and gameplay aspects on creating a fun and engaging atmosphere.

During the treasure hunt, how often did you need to collaborate with other players to figure out answers to hints or progress?
Do you think the social and treasure hunt aspects of Habib Verse create a fun and engaging atmosphere? (Why or not?)

5.2.4 Play Test Findings

Character Customization:

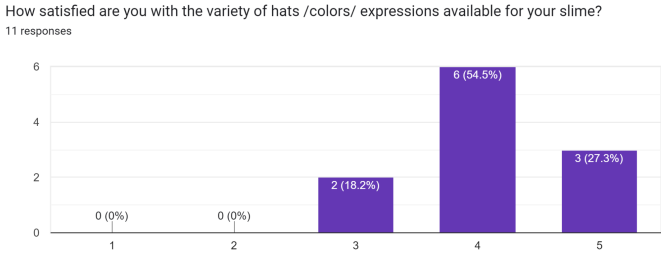
- *How important is character customization to you in a game?*



Histogram 5.7

Almost half of the respondents rated character customization as very important. These findings suggest that allowing players to customize their characters could be a positive feature for the game.

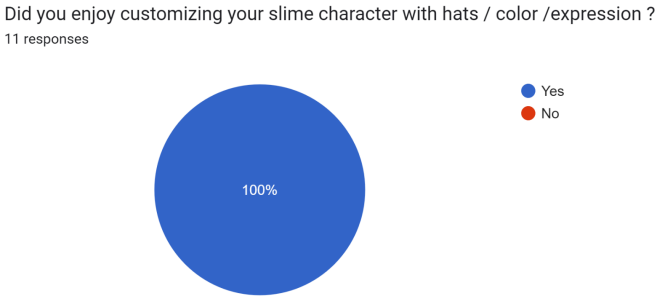
- *How satisfied are you with the variety of hats/colors/expressions available for your*



Histogram 5.8

Players seem very satisfied with the variety of customization options available in Habib Verse. This is likely because a significant portion of respondents (54.5%) rated the variety as very high.

- *Did you enjoy customizing your slime character with hats/color/expression?*



Pie Chart 5.9

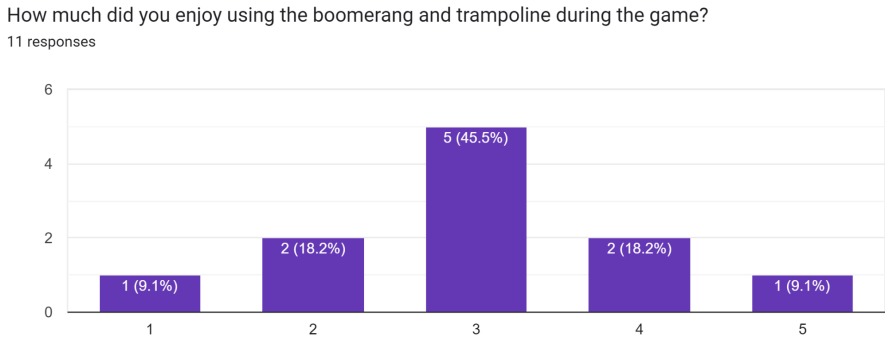
This suggests that customization is a well-received feature in the game.

- *Did the hats/color/expression add to your enjoyment of the game? How?*
- *Did the customization for your slime allow you to create a slime character that felt unique to you? Did it help you to express yourself? (Yes/No/Why or why not?)*

Players overwhelmingly felt that customizing their slime characters with hats, colors, and expressions significantly enhanced their enjoyment of Habib Verse. This personalization allowed them to create unique slimes that stood out from others, adding a layer of fun and individuality to the gameplay ("personal touch," "makes my character different from the others’," "adds fun by adding some uniqueness to the game"). The majority of players were also able to use these options to express themselves, crafting slimes that reflected their personal preferences ("portray what I envisioned," "personalized flair," "because I can make my character personalised"). The overall sentiment suggests that customization is a successful feature, with potential for further improvement through the addition of textured skins or other unique details (e.g., "there were a lot of options to choose from. To add more variety maybe textured skin can be added for example fur for the bunny etc.").

Gameplay Mechanics:

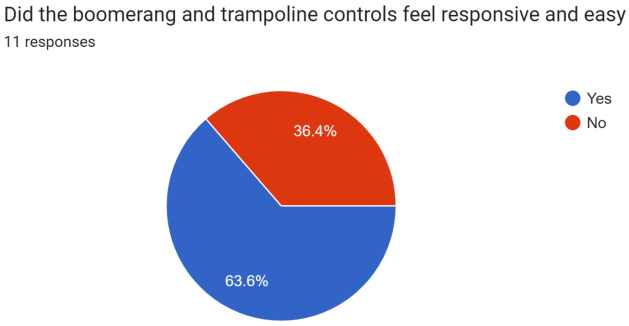
- *How much did you enjoy using the boomerang and trampoline during the game?*
- *(Why or not? How did these features add to your gameplay experience?)*



Histogram 5.10

Player responses regarding the boomerang and trampoline features in Habib Verse are mixed. While some found them to be a fun and exciting addition to the gameplay experience ("part of fun and excitement," "fun experience to use these tools"), others reported issues that hindered their enjoyment. Several players didn't get to experience the features at all ("I didn't get to experience it properly," "I did not explore this feature"), and one player specifically mentioned aiming issues with the trampoline ("The trampoline throw needs some consistency right now"). This suggests that refining the controls and ensuring players understand how to use these features could significantly improve their overall reception.

- *Did the boomerang and trampoline controls feel responsive and easy to use?*
- *If not, how could the controls be improved?*

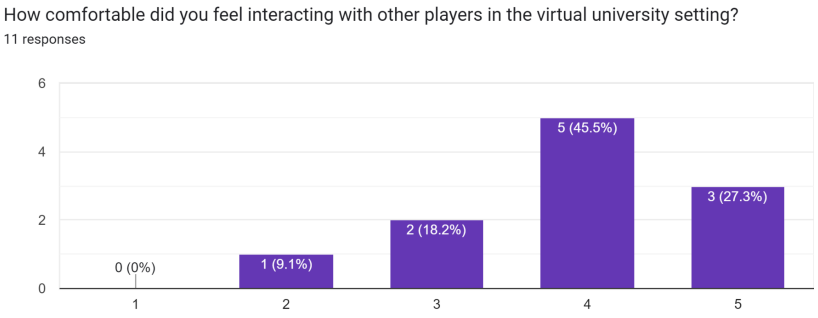


Pie Chart 5.11

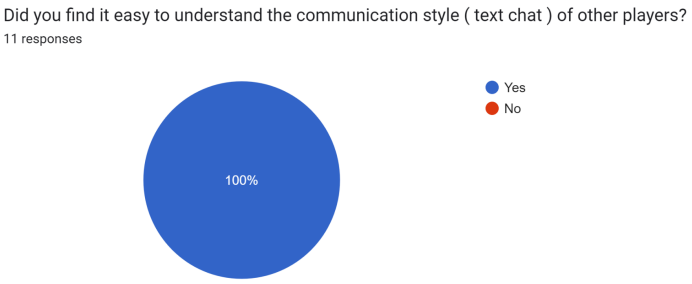
Opinions on the boomerang and trampoline features were split. Some players echoed the desire for personalization by suggesting clearer instructions on how to use them ("maybe instructions on how to use"). Addressing these issues could significantly improve our overall gameplay experience.

Social Interaction:

- *How comfortable did you feel interacting with other players in the virtual university setting?*
- *Did you find it easy to understand the communication style (text chat) of other players?*



Histogram 5.12

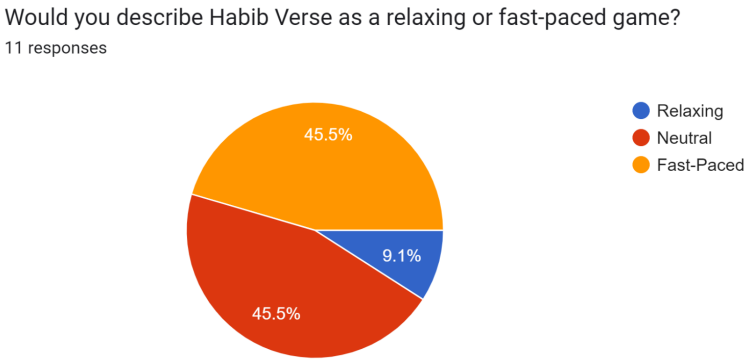


Pie Chart 5.13

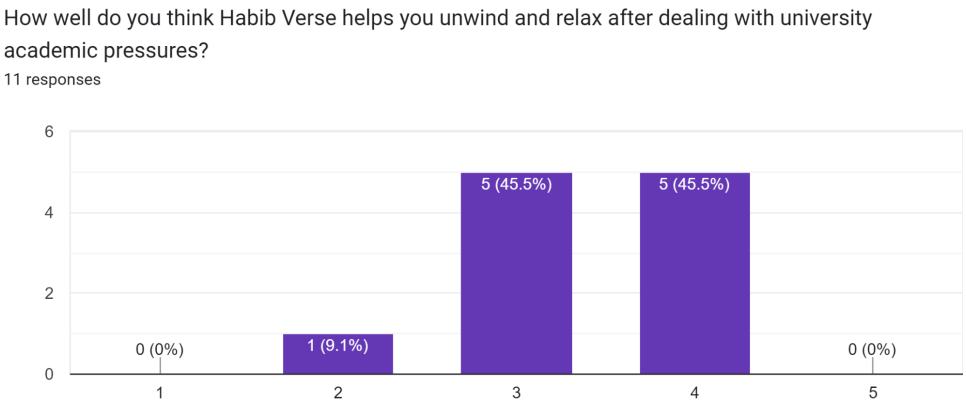
Players seem to feel comfortable interacting with others in Habib Verse. Over half reported feeling very or much at ease, suggesting a welcoming social environment . This comfort level is further supported by all players finding it easy to understand text chat communication. This removes a barrier to collaboration and promotes positive social interaction within the game.

Relaxation and Exploration:

- *Would you describe Habib Verse as a relaxing or fast-paced game?*
- *How well do you think Habib Verse helps you unwind and relax after dealing with university academic pressures?*



Pie Chart 5.14

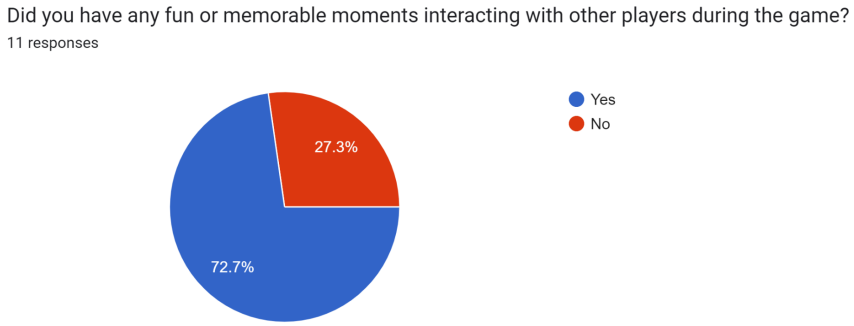


Histogram 5.15

The data suggest that Habib Verse is perceived as an effective tool for unwinding after academic stress with a significant portion (e.g., over 40%) of players selecting "Very Much" or "Much" for relaxation despite the way they describe the game.

Social Engagement:

- *Did you have any fun or memorable moments interacting with other players during the game? (If yes, please describe one such moment.)*



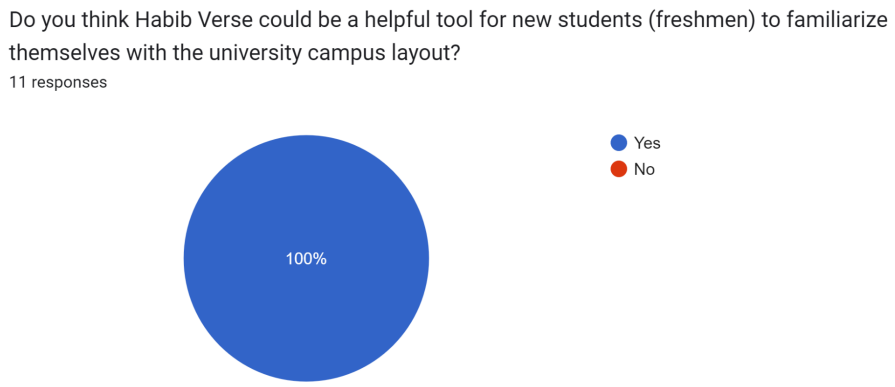
Pie Chart 5.16

Analysis of memorable moments with other players highlights both playful interactions and potential limitations. Players enjoyed fun activities like "shooting boomerangs" and casual chatting with friends, creating a lighthearted social atmosphere.

Campus Familiarization:

- *Do you think Habib Verse could be a helpful tool for new students (freshmen) to familiarize themselves with the university campus layout? (Why or not? How could it be*

improved for this purpose?)

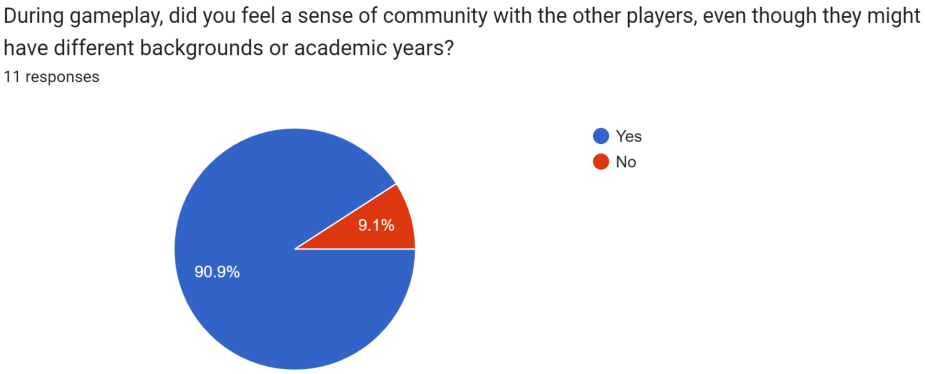


Pie Chart 5.17

The overall outlook is positive. Players acknowledge its potential to help new students learn the layout ("It lays out the map...definitely helpful") and memorize routes ("memorize the routes"). However, suggestions for more comprehensive maps ("more maps") and a mini-map for better wayfinding ("You can add a mini map") highlight areas for improvement.

Community Building:

- *During gameplay, did you feel a sense of community with the other players, even though they might have different backgrounds or academic years? (Why or not? What aspects of the game contributed to this feeling (or lack thereof)?)*



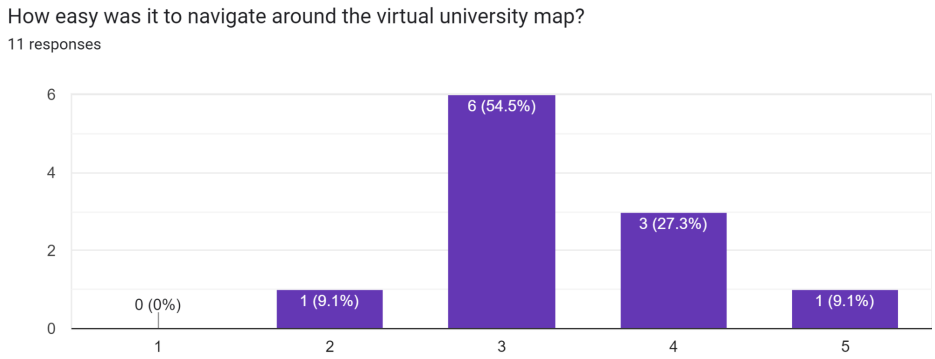
Pie Chart 5.18

Analysis of the community aspects in Habib Verse reveals a positive connection between social interaction features and a shared sense of space. The chat option ("The chatting option did it

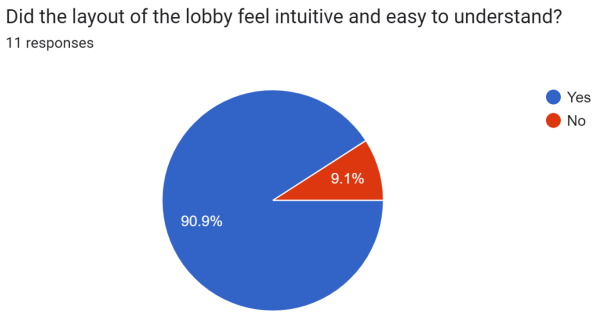
there") was highlighted as a key factor in fostering communication and potentially friendships ("one can make friends while playing this game"). This social interaction, along with the familiar campus environment ("because we all treat the campus as our second home"), seems to have created a sense of shared experience and community. While some existing friendships might have influenced the perception ("Being a senior...playing with people I was playing with, however, if i were a first year student the game is an excellent opportunity to make friends with new people on campus"), the potential for new connections suggests Habib Verse could be a valuable tool for building a sense of community among students, especially new freshmen.

Navigation:

- *How easy was it to navigate around the virtual university map?*
- *Did the layout of the lobby feel intuitive and easy to understand? (If no, what aspects of the layout were confusing?)*



Histogram 5.19



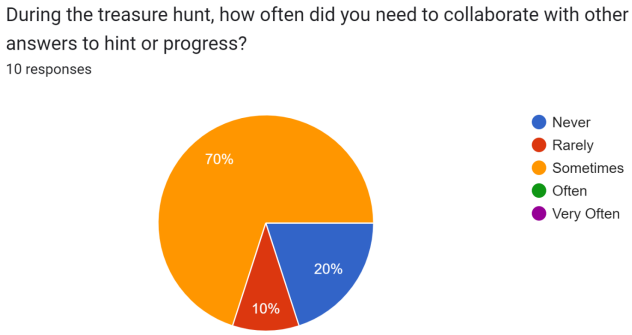
Pie Chart 5.20

The layout of the Habib Verse lobby appears to be a success, with the majority of the players finding it "great" and "easy to navigate around." This positive feedback (81.8%) indicates an

intuitive and user-friendly design that prioritizes in-game functionality. No comments mentioned confusing aspects or a lack of resemblance to the real Habib library. This suggests the layout effectively serves its purpose within the game environment, even if it might not be an exact replica.

Treasure Hunt:

- *During the treasure hunt, how often did you need to collaborate with other players to figure out answers to hints or progress?*
- *Do you think the social and treasure hunt aspects of Habib Verse create a fun and engaging atmosphere? (Why or not?)*



Pie Chart 5.21

Treasure hunt aspects in Habib Verse reveal a strong synergy that creates a fun and engaging atmosphere. Players highlighted collaboration ("players help each other...community") as a key factor, with the treasure hunt fostering teamwork and a sense of community ("playing with friends is fun"). This collaborative aspect is further enhanced by the chat option, facilitating communication and potentially building friendships ("chat option made the game more interactive"). The treasure hunt itself is intrinsically engaging, described as "fun" and "sporty," adding a layer of competition and excitement ("competitive aspect"). One response even suggests it might be a helpful tool for new students to learn the campus layout ("Collaborative, helps in identifying locations"). Overall, the social and treasure hunt features effectively combine to create a positive social experience within Habib Verse.

5.2.5 Discussion

The Habib Verse playtest provided valuable insights into player experience across various game aspects, directly addressing the research questions outlined in Table 1.

Customization and Uniqueness (RQ 1.3): Character customization was a resounding success. Players appreciated the variety of options for hats, colors, and expressions, allowing them to create unique and personalized slime avatars. This finding aligns with research suggesting the importance of character customization in fostering a sense of individuality and player identity within games.Further exploration of customization options, such as textured skins, could potentially enhance this aspect even further.
Relaxation and Potential Benefits (RQ 1.3): Another positive outcome was the emergence of Habib Verse as a potential tool for relaxation after academic stress. This suggests the game's mechanics and environment, particularly the familiar campus setting, might contribute to feelings of ease and comfort.

Social Interaction and Community Building (RQ 1.3): The combination of a welcoming social environment and clear text chat communication facilitated positive social interactions, as envisioned in RQ 1.3. The collaborative treasure hunt element emerged as a particularly strong driver of connection. Players praised its fun and engaging nature, highlighting its potential to foster communication especially among unfamiliar peers. This aligns with research on the positive role of collaborative gameplay in promoting social interaction and reducing social anxiety.

Playability and Software Refinements (RQ 1.3): While the playability aspects like the virtual campus environment were generally well-received, the boomerang and trampoline mechanics warrant further attention. Feedback suggests that control refinements and clearer instructions are necessary to maximize player enjoyment. Similarly, the wayfinding system could benefit from the implementation of a mini-map to enhance campus exploration within the game.

5.2.6 Conclusion and Future Work

Feelings of isolation among students is a very important issue to address. Isolation was most apparent among students who lacked communication skills as a result of difference in cultures, language barriers and lack of free time. The consequences of such isolation not only were harmful to a student's academic experience but their overall university experience. When it came to the student body in Habib University, we saw students did not have free time to engage in community building with their peers and when they did there were not enough fun activities for them to engage in.

As a result, our game’s goal of eliminating isolation through gamified interactions became all the more relevant as it leveraged the university experience and provided an easy access to these interactions on the go. The design of Habib Verse revolved around two core gameplay modes and a character customization system that allowed players to create unique characters and make meaningful bonds. Through our treasure hunt mode players were able to leverage their knowledge of the campus environment. Through our free roam mode players were able to relax and just bond with the people they interact with.

Both of our playtests saw meaningful feedback from players. Based on feedback from these playtests for future work we aim to make better replicas of our campus environment for the treasure hunt modes and add more gameplay options for our free roaming mode. We also aim to smooth the process of getting into a game with other players in order to allow greater playtests.

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